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Geographic Variation in the Delivery of High-Value Public Health Services: Exploring Causes & Consequences

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Disclosures

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- Data provided by the National Association of County and City Health Officials, National Profile of Local Health Departments
- Findings do not necessarily represent the views of RWJF or NIH
Diffusion of Public Health PBRNs

- First cohort (December 2008 start-up)
- Second cohort (January 2010 start-up)
- Affiliate/Emerging PBRNs (2011-14)
PBRNs as Mechanisms for Learning

Identify Common questions of interest

Engaged practice settings

Research partner

Apply Rigorous research methods

Data exchange

Analysis & interpretation

Translation & application

Common questions of interest

Rigorous research methods

Data exchange

Analysis & interpretation

Translation & application
Multi-Network Practice and Outcome Variation Examination Study (MPROVE)

6 Participating PBRNs

- Identify implementation measures high-value services:
  - Chronic disease prevention
  - Communicable disease control
  - Environmental health protection

- Create registry of measures: consistent across communities

- Profile geographic variation in the delivery of selected public health services across local communities

- Decompose variation into attributable components:
  - need-sensitive or preference-sensitive factors
  - supply-sensitive factors

- Examine associations between service delivery & outcomes
Public Health Delivery and Cost Studies (DACS)

11 Participating PBRNs

- Adapt & apply established cost measurement/estimation methodologies to public health settings
- Identify the costs of implementing selected high-value public health services
- Assess how costs vary across institutional and community settings
- Examine the determinants and consequences of variation in the costs of implementation
  - Economies of scale and scope
  - Efficiency & productivity
  - Equity
## Participating MPROVE networks

<table>
<thead>
<tr>
<th>Network</th>
<th>State Agencies</th>
<th>Local Agencies*</th>
<th>Academic Units</th>
<th>Other</th>
<th>Total</th>
<th>Lead Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>1</td>
<td>55</td>
<td>2</td>
<td>15</td>
<td>73</td>
<td>Association</td>
</tr>
<tr>
<td>FL</td>
<td>1</td>
<td>67</td>
<td>3</td>
<td>3</td>
<td>74</td>
<td>Local agency</td>
</tr>
<tr>
<td>MN</td>
<td>1</td>
<td>75</td>
<td>1</td>
<td>1</td>
<td>78</td>
<td>State agency</td>
</tr>
<tr>
<td>WA</td>
<td>1</td>
<td>36</td>
<td>2</td>
<td>1</td>
<td>40</td>
<td>Local agency</td>
</tr>
<tr>
<td>NJ</td>
<td>1</td>
<td>100</td>
<td>2</td>
<td>1</td>
<td>104</td>
<td>Academic</td>
</tr>
<tr>
<td>TN</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>20</td>
<td>Academic</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>337</strong></td>
<td><strong>12</strong></td>
<td><strong>22</strong></td>
<td><strong>371</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Local Agencies count includes the state agency network.
**MPROVE measurement dimensions**

- **Availability/Scope:** specific activities produced
- **Volume/Intensity:** Frequency of producing activity over period of time
- **Capacity:** Labor and capital inputs assigned to an activity
- **Reach:** Proportion of target population reached by activity
- **Quality:** effectiveness, timeliness, equity of activity
- **Efficiency:** resources required to produce given volume of activity
Levels of measurement

- **Community Level**: Includes services/activities regardless of who performs/contributes

- **Agency Level**: Focuses on activities directly contributed by governmental public health agency
Measure selection criteria

- Expected health impact
- Expected economic impact
- Control/influence by local public health agencies and their partners
- Pre-existing evidence of validity and reliability
- Feasibility of obtaining data
Example: Delphi Rating of Measures
Final MPROVE Measures

- Chronic disease prevention (8 measures)
  - Tobacco prevention
  - Obesity prevention

- Communicable disease control (14 measures)
  - Immunization
  - Enteric disease control
  - STI control
  - Tuberculosis control

- Environmental health protection (5 measures)
  - Lead exposure protection
  - Food safety protection
Analytic Methods

- MPROVE data linked with 2013 NACCHO Profile data on agency characteristics, and 2013 ARF data on community characteristics
- Hierarchical random and fixed effects models estimate patterns and correlates of variation
- Variance decomposition analyses identify the relative contributions of institutional and community factors in explaining local variation
Proportion of local settings reporting MPROVE measures

- Healthy food (A)
- Physical activity (A)
- Tobacco (A)
- Physical activity (C)
- Oral health prevention (A)
- STI cases (C)
- Immunization (A)
- Healthy food staffing (A)
- Enteric confirmed cases (C)
- Enteric reported cases (C)
- Food inspection volume (A)
- Agency PA funding (A)
- Oral health screening (A)
- Lead rate (C)
- Smoking enforcement (C)
- Enteric completion time (A)
- TB case volume (C)
- Enteric investigations (A)
- STI staffing (A)
- Vaccine preventable diseases (C)
- Immunization (C)
- TB contact treatment (A)
- Food inspection reach (A)
- STI contact tracing (A)
- Food safety staffing (A)
- TB treatment (A)
- Lead investigation (A)
- TB contact screening (A)
### Local Health Department Resources Allocated to Promoting Physical Activity, Per Capita

<table>
<thead>
<tr>
<th></th>
<th>CO</th>
<th>FL</th>
<th>MN</th>
<th>NJ</th>
<th>TN</th>
<th>WA</th>
<th>6-States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>29%</td>
<td>35%</td>
<td>53%</td>
<td>52%</td>
<td>100%</td>
<td>67%</td>
<td>46%</td>
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<tr>
<td>If &gt;0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Minimum</td>
<td>0.07</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.17</td>
<td>0.10</td>
<td>0.00</td>
</tr>
<tr>
<td>25th pctle</td>
<td>0.10</td>
<td>0.05</td>
<td>0.13</td>
<td>0.04</td>
<td>0.17</td>
<td>0.16</td>
<td>0.08</td>
</tr>
<tr>
<td>50th pctle</td>
<td>0.47</td>
<td>0.24</td>
<td>0.33</td>
<td>0.08</td>
<td>0.17</td>
<td>0.31</td>
<td>0.19</td>
</tr>
<tr>
<td>Mean</td>
<td>5.30</td>
<td>0.80</td>
<td>1.30</td>
<td>0.54</td>
<td>0.17</td>
<td>0.57</td>
<td>1.52</td>
</tr>
<tr>
<td>75th pctle</td>
<td>1.94</td>
<td>0.43</td>
<td>0.95</td>
<td>0.19</td>
<td>0.17</td>
<td>0.62</td>
<td>0.48</td>
</tr>
<tr>
<td>Maximum</td>
<td>47.11</td>
<td>5.29</td>
<td>18.37</td>
<td>8.96</td>
<td>0.17</td>
<td>2.27</td>
<td>47.11</td>
</tr>
</tbody>
</table>
Implementation of community-wide health education campaigns to promote physical activity
### Agency implementation of services/supports to reduce tobacco use and/or exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>CO</th>
<th>FL</th>
<th>MN</th>
<th>NJ</th>
<th>TN</th>
<th>WA</th>
<th>6-States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agencies providing tobacco services &amp; supports (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Educational materials</td>
<td>90%</td>
<td>89%</td>
<td>73%</td>
<td>80%</td>
<td>100%</td>
<td>83%</td>
<td>83%</td>
</tr>
<tr>
<td>2 Educational media</td>
<td>56%</td>
<td>66%</td>
<td>40%</td>
<td>17%</td>
<td>100%</td>
<td>28%</td>
<td>41%</td>
</tr>
<tr>
<td>3 Cultural/linguistic specific materials</td>
<td>60%</td>
<td>62%</td>
<td>25%</td>
<td>41%</td>
<td>0%</td>
<td>31%</td>
<td>44%</td>
</tr>
<tr>
<td>4 Cultural/linguistic specific programs</td>
<td>60%</td>
<td>81%</td>
<td>48%</td>
<td>38%</td>
<td>100%</td>
<td>28%</td>
<td>52%</td>
</tr>
<tr>
<td>5 Educational/training programs</td>
<td>42%</td>
<td>45%</td>
<td>8%</td>
<td>16%</td>
<td>0%</td>
<td>10%</td>
<td>24%</td>
</tr>
<tr>
<td>6 Community development</td>
<td>37%</td>
<td>81%</td>
<td>48%</td>
<td>41%</td>
<td>100%</td>
<td>52%</td>
<td>51%</td>
</tr>
<tr>
<td>7 Policy development</td>
<td>44%</td>
<td>79%</td>
<td>56%</td>
<td>46%</td>
<td>50%</td>
<td>41%</td>
<td>53%</td>
</tr>
<tr>
<td>8 Policy implementation</td>
<td>44%</td>
<td>30%</td>
<td>--</td>
<td>45%</td>
<td>100%</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>9 Tobacco cessation programs</td>
<td>--</td>
<td>32%</td>
<td>--</td>
<td>9%</td>
<td>50%</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>10 Adult tobacco use surveillance</td>
<td>--</td>
<td>57%</td>
<td>--</td>
<td>13%</td>
<td>50%</td>
<td>28%</td>
<td>31%</td>
</tr>
<tr>
<td>11 Youth tobacco use surveillance</td>
<td>--</td>
<td>--</td>
<td>79%</td>
<td>12%</td>
<td>--</td>
<td>--</td>
<td>40%</td>
</tr>
<tr>
<td>Agencies providing all services/supports (%)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Agencies providing any of the services/supports (%)</td>
<td>94%</td>
<td>96%</td>
<td>96%</td>
<td>87%</td>
<td>100%</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Average number of services/supports offered (mean)</td>
<td>4.33</td>
<td>6.21</td>
<td>3.77</td>
<td>3.57</td>
<td>6.50</td>
<td>3.59</td>
<td>4.29</td>
</tr>
</tbody>
</table>
Average FTE staffing for communicable disease intervention specialists per 100,000 population
Average completion time for enteric disease investigations
Overall Patterns of Variation in Local Public Health Implementation

Estimates from random effects regression models
Correlates of Variation in Local Public Health Implementation

% of Total Variance

- Unexplained local
- Unexplained state
- Local BOH
- LHD $/capita
- Race
- Income/capita
- PopIn

Estimates from state fixed-effects regression models *p<0.05
Preliminary Conclusions

- Wide variation in local availability of public health implementation measures
- Considerable within-state and between-state variation in implementation
- Patterns of variation are specific to domain & activity
- Institutional and community characteristics explain 30-50% of this variation
  - Harmful?
  - Wasteful?
  - Inequitable?
Ongoing cross-state analyses

- Predictive & convergent validity tests
- Refining patterns & determinants of variation
  - Disentangling demand (need) from supply
  - System structure
  - Geospatial
  - Within and across domains of activity: composite measures
- Identifying population health correlates of variation
Acknowledgements

- PBRN partners in CO, NJ, FL, WA, MN, TN, and NC played vital roles in the design and execution of this study.

- Additional data was provided by the National Association of County and City Health Officials, from the National Profile of Local Health Departments.

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For More Information

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